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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,472	12/02/2003	Haihong Wang	039153-0697	5867

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EXAMINER

LINDSAY JR, WALTER LEE

ART UNIT PAPER NUMBER

2812

DATE MAILED: 06/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/726,472

Applicant(s)

WANG ET AL.

Examiner

Walter L. Lindsay, Jr.

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-14 is/are allowed.
- 6) ☒ Claim(s) 15, 17, 18 and 20 is/are rejected.
- 7) ☒ Claim(s) 16 and 19 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

This Office action is in response to the application filed on 12/2/2003.

Currently, claims 1-20 are pending.

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 15, 17-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liang et al. (U.S. Patent No. 6,071,783 dated 6/6/2000) in view of Chung (U.S. Patent No. 5,943,575 dated 8/24/1999).

Liang shows the method substantially as claimed in figures 1-8 and corresponding text as: providing a substrate... (1)(col. 2, line 64-col. 3, line 19); forming a gate insulator (3) and a gate (4) over the "substrate"(col. 3, lines 20-45); forming shallow source (6b) and drain (6c) extensions at opposing sides of the gate (col. 4, lines 6-16) ; forming a spacer (7) around the gate (col. 3, lines 46-60); etching the "substrate" layer to form trenches (8a) at said opposing sides of the gate (col. 4, lines 1-16); forming silicon regions (11) in the trenches (col. 4 lines 39-59); implanting deep source (12) and drain (12) regions in the silicon regions at said opposing sides of the gate, wherein a depth of the deep source and drain regions after said implanting does not extend beyond a depth of the silicon regions (claim 15) (col. 4 line 58 –col. 5 line 5).

Liang shows the method further comprising annealing to activate dopants (col. 4, lines 39-65). Liang shows after annealing, the depth of the deep source and drain regions does not extend beyond the depth of the silicon regions (col. 4, line 39 – col. 5, line 5).

Liang lacks anticipation only in not explicitly teaching that: 1) the substrate of claim 15 maybe formed of silicon germanium (claim 15); and 2) the silicon regions are formed in the trenches by selective epitaxial growth (claim 20).

Chung teaches a method of forming trenches in a semiconductor substrate (21) in a very similar semiconductor device process, which shows growing an epitaxial silicon layer (25) grown in the trench area of the substrate and then implanting dopants

into the epitaxial layer forming source and drain regions (36) (col. 4 lines 32-63). The semiconductor substrate of Chung can consist of silicon, silicon germanium and the like.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method shown in Liang, by using the semiconductor substrate as is allowed by Chung and the silicon epitaxial growth layer as taught by Chung, with the motivation that both Liang and Chung attempt to prevent leakage current, reduce parasitic capacitance and punchthrough in related semiconductor devices.

Allowable Subject Matter

4. Claim 16 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. Claims 1-14 are allowed.

6. The following is a statement of reasons for the indication of allowable subject matter: the prior art, either singly or in combination fails to anticipate or render obvious, the limitations of:

...providing a substrate comprising a layer of silicon germanium having a layer of strained silicon formed thereon..., as required by claims 1, 14 and 16 respectively.

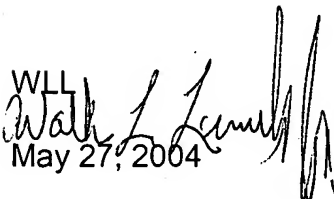
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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter L. Lindsay, Jr. whose telephone number is (571) 272-1674. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John F Niebling can be reached on (571) 272-1679. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

WLL

May 27, 2004


John F. Niebling
Supervisory Patent Examiner
Technology Center 2800